

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application: Kusy et al.

Confirmation No.: 9571

Application No.: 10/729,412

Group Art Unit: 1791

Filed: December 5, 2003

Examiner: Patrick Butler

For: *Pultrusion Apparatus for Continuous Fabrication of Fiber-Reinforced Plastic Articles Having a Non-Linear Shape, Methods of Fabricating Such Articles and Compositions Used Therein*

Date : April 17, 2008

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 41.67

Sir:

This Appeal Brief is filed pursuant to the "Notice of Appeal to the Board of Patent Appeals and Interferences" filed February 18, 2008.

Real Party In Interest

The real party in interest is assignee University of North Carolina at Chapel Hill.

Related Appeals and Interferences

Appellants are aware of no appeals or interferences that would be affected by the present appeal.

Status of Claims

Claims 8-20, 42 and 43 are pending and stand rejected. Appellants appeal the final rejection of Claims 8-20, 42 and 43 by the Final Office Action dated October 17, 2007 (the Action). Claims 8, 9, 14-18, 20, 42 and 43 stand rejected in the Action under 35 U.S.C. §103(a) as being anticipated by U.S. Patent No. 5,700,417 to Fernyhough et al. ("Fernyhough"). Claims 10-14, 16, 18 and 19 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Fernyhough in view of U.S. Patent No. 4,464,121 to Schäper ("Shäper").

Status of Amendments

The Appendix of Claims submitted herewith reflects the state of the claims of record. No amendments have been filed subsequent to the Final Action.

Summary of Claimed Subject Matter

Independent Claim 8 recites a method of forming a fiber-reinforced plastic article 112. *See* page 8, lines 10-15; Figures 1-2. The method includes continuously pultruding a fiber-reinforced plastic article 112 to form a fiber-reinforced plastic article 112 having a first partially cured state. *See* page 8, lines 15-29; Figures 1-2. The fiber-reinforced plastic article 112 having the first partially cured state is continuously shaped into a spirally wound shape, and then the fiber-reinforced plastic article 112 having the first partially cured state is cured to form a spirally wound fiber-reinforced plastic article 112 having a second cured state that is more rigid than the fiber-reinforced plastic article having the first partially cured state. *See* page 8, lines 15-29; Figures 1-2.

Claim 42 depends from Claim 8 and recites that the curing step is performed when the fiber-reinforced plastic article is in the spirally wound shape. *See* page 8, lines 15-29; page 9, lines 9-11 (energy source 120); Figures 1-2. Claim 43 depends from Claim 42 and further recites that the curing step includes inputting energy into the fiber-reinforced plastic article. *See* page 8, lines 15-29; page 9, lines 9-11 (energy source 120); Figures 1-2.

Grounds of Rejection to be Reviewed on Appeal

1. Whether Claims 8-20 and 42-43 are properly rejected under 35 U.S.C. 103(a) as being unpatentable over Fernyhough and/or Schäper.

Argument

I. Introduction

As stated in the Examination Guidelines for Determining Obviousness Under 35 U.S.C. §103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.* (M.P.E.P. §2141), a question regarding whether a claimed invention is obvious under 35 U.S.C. § 103 must include an analysis of the factors set forth in *Graham v. John Deere Co.* (383 U.S. 1, 148 USPQ 459 (1966)), which are described by the Supreme Court in the *KSR* decision to be 1) determining the scope and content of the prior art; 2) ascertaining the

differences between the claimed invention and the prior art; and 3) resolving the level of ordinary skill in the pertinent art (hereinafter, the "*John Deere* factors"). A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U. S. 1, 15 (2007). A Court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 13.

Accordingly, the key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. M.P.E.P. § 2143. Although it has been held in cases such as *In re Einstein*, 8 USPQ 166 (CCPA 1931)(cited in the Action), that the reversal of the operation of parts is an obvious expedient, Courts have also cautioned that such findings must be based on a determination of obviousness under § 103, and not upon a "mechanical rule." See *In re Wright*, 145 USPQ 182, 190 (CCPA 1965) and *In re Ochiai*, 37 USPQ2d 1127, 1133 (Fed Cir. 1995). As stated by the Federal Circuit in *In re Ochiai*, 37 USPQ2d 1127, 1133 (Fed Cir. 1995), "reliance on *per se* rules of obviousness is legally incorrect and must cease." See also *Ex parte Granneman*, 68 USPQ2d 1219, 1220-1221 (Bd. Pat. App. & Int. 2003)(Nonprecedential opinion stating that the patent examiner's reliance on *per se* rule that duplication of parts renders the invention obvious fails to establish a *prima facie* case obviousness because the examiner has not explained why the prior art would have suggested to one of ordinary skill in the art the desirability of the modification) and *Ex parte Piltingsrud*, pp. 12-13, BPAI Appeal No 2000-0078 (Feb. 8, 2000)(Nonprecedential opinion stating that findings that the reversal of operation of parts is an "obvious expedient" must be based upon a determination of obviousness under § 103 and not upon a "mechanical rule.").

As stated in the M.P.E.P. §2144.04:

The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device." *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Int. 1984).

Appellants submit that the present rejections should be reversed because the cited art does not disclose all of the elements recited in the claims, and there is no apparent reason

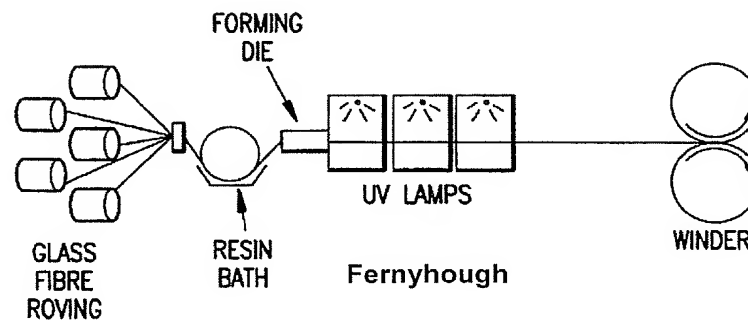
why one skilled in the art would have modified the cited art to arrive at the presently claimed subject matter. In addition, the claim recitations are not a "mere reversal of essential working parts" as alleged by the Examiner.

II. Independent Claim 8

Claim 8 recites a method of forming a fiber-reinforced plastic article, said method comprising the steps of:

continuously pultruding a fiber-reinforced plastic article to form a fiber-reinforced plastic article having a first partially cured state;
continuously shaping the first fiber-reinforced plastic article having the first partially cured state into a spirally wound shape; and then
curing the fiber-reinforced plastic article having the first partially cured state to form a spirally wound fiber-reinforced plastic article having a second cured state that is more rigid than the fiber-reinforced plastic article having the first partially cured state.

Fernyhough merely discusses several types of electromagnetic radiation that have been used for the curing of polymers. As illustrated in the drawing of Fernyhough, the UV lamps that cure the polymer are positioned before the winder (reproduced below). Fernyhough discusses that "the wicked fibers are exposed to ultraviolet (UV) radiation from UV lamps for cure, and then wound up by a winder." See, column 1, lines 42-44 of Fernyhough (cited in the Action (emphasis added)).



Therefore, Fernyhough teaches curing the fibers with UV radiation before winding the fibers on a winder. Appellants submit that Fernyhough does not teach or render obvious continuously shaping the first fiber-reinforced plastic article having the first partially cured state into a spirally wound shape, and then curing the fiber-reinforced plastic article having the first partially cured state to form a spirally wound fiber-reinforced plastic article having a second cured state as recited in Claim 8.

The Examiner alleges that Fernyhough "discloses the claimed invention except for arranging the duplicate cure step after winding to fully cure..." and further states as follows:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the duplicate cure step after winding to fully cure, since it has been held that a mere reversal of essential working parts of a device involves only routine skill in the art. See the Action, page 3 (citing *In re Einstein*, 8 USPQ 167).

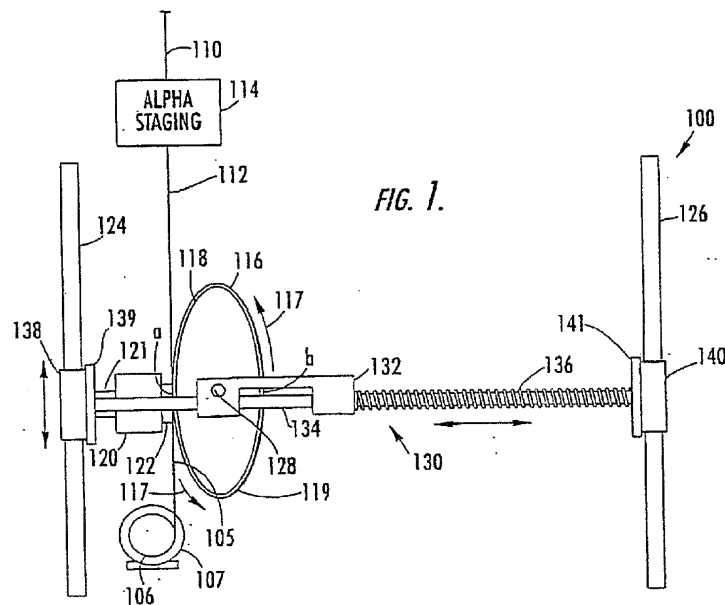
The quotation above is the entire extent of the Examiner's reasons to support his determination of obviousness, and as such, constitutes an improper application of a mechanical or per se rule. See *In re Wright*, 145, USPQ 182, 190 (CCPA 1965) and *In re Ochiai*, 37 USPQ2d 1127, 1133 (Fed Cir. 1995).

In fact, Fernyhough states that the reinforcing fiber is wetted with a resin formulation "and then pulled through die(s) to squeeze out excess resin and form the shape of the composite before and/or during the curing stage." See col. 4, lines 40-45. The pultrusion process of Fernyhough is a process "in which curing is effected in the course of pulling the impregnated fibres through a die." See col. 4, lines 63-65. Fernyhough also discusses advantages such as more rapid line speeds. See col. 7, lines 5-10. The resulting fiber can be used as a flexible strength member in cables. See col. 5, lines 22-34 ("the rod must be bendable or flexible...[t]he rod must have good folding durability..."). Appellants submit that there are simply no apparent reasons to modify Fernyhough and its rapid line curing in the straight line/UV lamp configuration in which the shape of the flexible fibers is formed by a die either before or during the curing stage to arrive at the claimed invention.

Specifically, Claim 8 recites continuously shaping the first fiber-reinforced plastic article having the first partially cured state into a spirally wound shape, and then curing the fiber-reinforced plastic article having the first partially cured state to form a spirally wound fiber-reinforced plastic article having a second cured state. The multi-stage curing, in which the plastic article having a first partially cured state is continuously shaped into a spirally wound shape and then cured, is not a mere reversal of the essential working parts of Fernyhough. Fernyhough provides no apparent reason why its flexible fibers would be cured when spirally wound, and additionally, provides no guidance regarding how the fibers would be cured in such a spirally wound shape.

As illustrated in Figure 1 of the current application, a pultrusion apparatus 100 includes an alpha-staging apparatus 114. In operation, a partially cured fiber-reinforced

plastic article 112 exits the alpha-staging apparatus 114 and is taken up on the mold 116. The mold 116 shapes the partially cured fiber-reinforced plastic article 112. An energy source 120 is operatively associated with the mold 116 and positioned so that the partially cured fiber-reinforced plastic article 112 is cured in a non-linear shape (i.e., spirally wound). Thus, a second cured state is achieved on the mold 116. Accordingly, the fiber-reinforced plastic article 112 can be cured to form a spirally wound fiber-reinforced plastic article having a second cured state that is more rigid than the fiber-reinforced plastic article 112 having the first partially cured state. Embodiments of the current invention may be useful in forming, for example, orthodontic appliances such as preformed arch wires having a parabolic shape formed by cutting an elliptically shaped spirally wound fiber-reinforced plastic article. *See* page 8, lines 1-9. These features are not appreciated by the single stage, linear curing techniques and flexible cured fibers of Fernyhough.



Accordingly, the rapid, linear single stage curing configurations of the cited art do not disclose all of the elements recited in the claims, and Appellants submit that there is no apparent reason one of ordinary skill in the art would have modified the prior art as proposed by the Examiner. Moreover, the apparent application of a *per se* rule alleging the "mere reversal of the essential working parts" absent a motivation or reason for the worker in the art, without the benefit of Appellants' specification, to make the necessary changes in the reference device, is improper.

For at least these reasons, the recitations of Claim 8 are not disclosed or rendered obvious by Fernyhough. Appellants submit that the deficiencies of Fernyhough are not remedied by Schäper, which is cited as allegedly teaching drawing a fiber-reinforced plastic between the spiral grooves of a stator and rotor. Accordingly, Claim 8 and Claims 9-20 depending therefrom are patentable over Fernyhough and Schäper, and Appellants request that the rejections under 35 U.S.C. § 103 be reversed.

III. Dependent Claims 42-43 are Separately Patentable

Claims 42-43 depend from Claim 8 and are patentable for the reasons discussed above. In addition, Claims 42-43 are separately patentable for the reasons that follow.

Claim 42 recites that the curing step is performed when the fiber-reinforced plastic article is in the spirally wound shape. Claim 43 depends from Claim 42 and further recites that the curing step includes inputting energy into the fiber-reinforced plastic article. Appellants submit that Fernyhough and Schäper do not teach or suggest that the curing step is performed when the fiber-reinforced plastic article is in the spirally wound shape and that the curing step includes inputting energy into the article as recited in Claims 42-43.

For at least these reasons, Appellants submit that Claims 42-43 are separately patentable and request that the rejection of such claims under § 103 be reversed.

CONCLUSION

In view of the above discussion, Appellants submit that the rejection of Claims 8-20 and 42-43 should be reversed and the present application passed to issue.

Respectfully submitted,




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CERTIFICATION OF ELECTRONIC TRANSMISSION

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Joyce Paoli

Claims Appendix

1.-7. (Canceled)

8. (Previously Presented) A method of forming a fiber-reinforced plastic article, said method comprising the steps of:

continuously pultruding a fiber-reinforced plastic article to form a fiber-reinforced plastic article having a first partially cured state;

continuously shaping the first fiber-reinforced plastic article having the first partially cured state into a spirally wound shape; and then

curing the fiber-reinforced plastic article having the first partially cured state to form a spirally wound fiber-reinforced plastic article having a second cured state that is more rigid than the fiber-reinforced plastic article having the first partially cured state.

9. (Previously Presented) The method according to Claim 8, wherein the shaping step comprises a step of molding the fiber-reinforced plastic article on a rotatable mold.

10. (Previously Presented) The method according to Claim 9, wherein the shaping step further comprises a step of drawing the fiber-reinforced plastic article having the first partially cured state through a die having a cross-section to form a fiber-reinforced plastic article having the first partially cured state and having substantially said cross-section.

11. (Original) The method according to Claim 10, wherein a portion of said rotatable mold defines a portion of said die, and wherein the drawing step and the molding step occur contemporaneously.

12. (Previously Presented) The method according to Claim 8, wherein the shaping step comprises a step of drawing the fiber-reinforced plastic article having the first cured state through a die having a cross-section to form a fiber-reinforced plastic article having the first partially cured state and having substantially said cross-section.

13. (Original) The method according to Claim 12, wherein the curing step and the drawing step occur contemporaneously.

14. (Original) The method according to Claim 8, wherein the curing step comprises inputting energy into the fiber-reinforced plastic article, and wherein a ratio of the energy input per unit length of the fiber-reinforced plastic article is substantially constant.

15. (Original) The method according to Claim 14, wherein the energy is electromagnetic radiation.

16. (Original) The method according to Claim 14, wherein the energy is thermal energy.

17. (Original) The method according to Claim 8, wherein the pultruding step comprises the steps of:

shaping an uncured fiber-reinforced plastic article; and

curing the uncured fiber-reinforced plastic article to form the fiber-reinforced plastic article having a first partially cured state.

18. (Original) The method according to Claim 17, wherein the step of curing the uncured fiber-reinforced plastic article comprises inputting a first type of energy into the uncured fiber-reinforced plastic article, and wherein the step of curing the fiber-reinforced plastic article having the first partially cured state comprises inputting a second type of energy into the fiber-reinforced plastic article having the first partially cured state.

19. (Original) The method according to Claim 18, wherein the first type of energy and the second type of energy are different.

20. (Original) The method according to Claim 18, wherein the first type of energy is electromagnetic radiation in the ultraviolet spectrum, and wherein the second type of energy is electromagnetic radiation in the visible spectrum.

21.-41. (Canceled).

42. (Previously Presented) The method according to Claim 8, wherein the curing step is performed when the fiber-reinforced plastic article is in the spirally wound shape.

43. (Previously Presented) The method according to Claim 42, wherein the curing step comprises inputting energy into the fiber-reinforced plastic article.

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Evidence Appendix

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Related Proceedings Appendix

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